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Lesson Three:

Atomic structure of matter

Atom

The basic building unit of matter that cannot exist freely

• Properties of an Atom:

1. The atom cannot be found in a free state, but it combines with other atoms
2. Atoms of an element are similar, and differs from another element.

The chemical symbols of the important elements:

Element	Symbol
Hydrogen	${}^1\text{H}$
Helium	${}^2\text{He}$
Lithium	${}^3\text{Li}$
Beryllium	${}^4\text{Be}$
Boron	${}^5\text{B}$
Carbon	${}^6\text{C}$
Nitrogen	${}^7\text{N}$
Oxygen	${}^8\text{O}$
Fluorine	${}^9\text{F}$

Element	Symbol
Neon	${}^{10}\text{Ne}$
Sodium	${}^{11}\text{Na}$
Magnesium	${}^{12}\text{Mg}$
Aluminum	${}^{13}\text{Al}$
Silicon	${}^{14}\text{Si}$
Phosphorus	${}^{15}\text{P}$
Sulphur	${}^{16}\text{S}$
Chlorine	${}^{17}\text{Cl}$
Argon	${}^{18}\text{Ar}$

Element	Symbol
Potassium	${}^{19}\text{K}$
Calcium	${}^{20}\text{Ca}$
Iron	Fe
Zinc	Zn
Copper	Cu
Gold	Au
Silver	Ag
Iodine	I
Bromine	Br

Important Notes:

- In Chemical symbols the first letter always written in capital letters.
- Chemical symbols are taken from the Latin not the English name

Sodium	Natrium	Na
Potassium	Kalium	K
Copper	Cuprum	Cu

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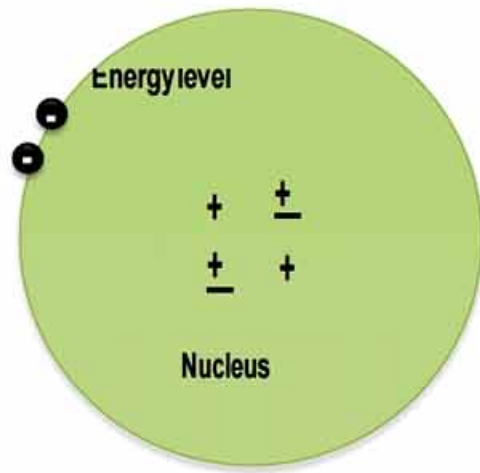
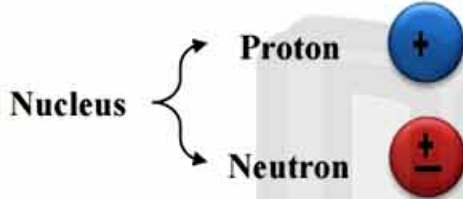
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The structure of the atom:

It consists of:

- Nucleus
- Energy Levels

Energy Level → Electron

a) Nucleus:

- Exist in the center of the atom.
- The mass of the atom is concentrated in it (**Give Reason**)
Bec. It contains protons and neutrons
 - Protons:** positively charged particles. (+ve)
 - Neutrons:** electrically neutral particles (uncharged). (±ve)

b) Energy levels.

- Energy level:** The paths of the electrons around the nucleus
- They are 7 energy levels (K-L-M-N-O-P-Q)
- They differ in size, energy and their capacity.

Electrons:

- Are very minute particles.
- Negatively charged particles. (-ve)
- Orbit the nucleus in energy levels
- Electrons orbit around the nucleus but do not fall in it. (**Give Reason**)
Bec. They orbit with high speed and escape.
- The atom is electrically neutral (G.R)**
Bec. The number of electrons equals the number of protons

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Comparing all the subatomic particles:

	Protons	Neutrons	Electrons
Position	In the nucleus	In the nucleus	Around the nucleus
Charge	Positive	Neutral	Negative
Mass	Greater than electron	Greater than electron	Extremely small [Can be neglected]

• The atom of each element is expressed by a chemical symbol:

- The mass number, written above the symbol from the left side.
- The atomic number, written below the symbol from the left side.

1. Atomic number:

- The number of protons in the nucleus.
- The number of electrons around the nucleus

2. Mass number:

- It is the sum of the numbers of protons & neutrons in the nucleus.

$$\text{Na Protons} = 11$$

$$\text{Na Electrons} = 11$$

$$\text{Na Neutrons} = 23 - 11 = 12$$

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Science Activity

How to calculate the number of protons, electrons and neutrons:

Chlorine, $^{35}_{17}\text{Cl}$ Protons = 17
 Electrons = 17
 Neutrons = 18

Magnesium, $^{24}_{12}\text{Mg}$ Protons = -----
 Electrons = -----
 Neutrons = -----

Hydrogen, ^1_1H Protons = -----
 Electrons = -----
 Neutrons = -----

How to calculate the mass number and atomic number:

1. If the nucleus of Oxygen atom contains 8 protons and neutrons. Find the atomic number and the mass number of Oxygen

- The atomic number = no. of protons = -----
- The mass number = no. of protons + no. of neutrons =
 = ----- + ----- = -----

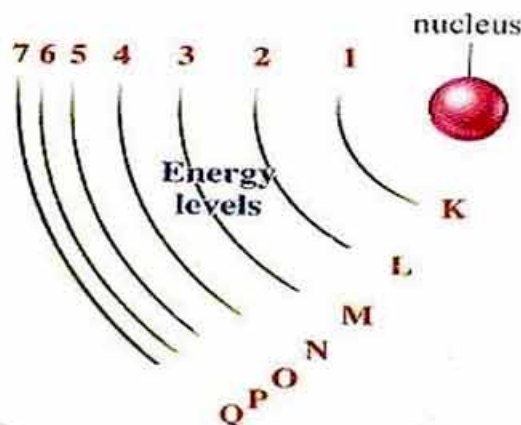
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Energy levels:

The orbits of electrons around the nucleus

- The energy level differs in energy.
- Energy of electron = Energy of level
- The energy increase away of the nucleus
- They are 7 main energy levels

**The Rule:** $2n^2$ where, (n) is number of the energy level

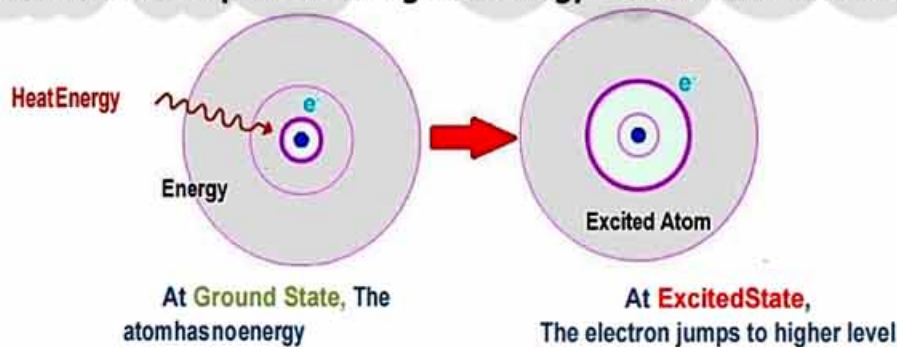
How to know the number of electrons that saturate the energy level:

This rule works only with the first four energy levels. (G.R)

- Because the atom will be unstable.
- 1. In the first energy level (K) = $2(1)^2 = 2 \times 1 = 2$ electrons
- 2. In the second energy level (L) = $2(2)^2 = 2 \times 4 = 8$ electrons
- 3. In the third energy level (M) = $2(3)^2 = 2 \times 9 = 18$ electrons
- 4. In the fourth energy level (N) = $2(4)^2 = 2 \times 16 = 32$ electrons

Important Note:

When an element heats up its atoms gains energy and become more excited



- **Excited atom:** The atom that gains a quantum of energy.
- **Quantum:** Amount of energy lost or gained by the electron

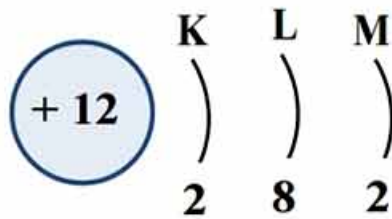
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Science Activity

The electronic configuration

Magnesium, 12Mg



Why the energy level K filled before L?

- Bec. The K level has lower energy than L level

Complete the following like the previous example by the help of figures:

Oxygen, 8O



Chlorine, 17Cl



Neon, 10Ne

Sodium, 11Na

Calcium, 20Ca

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The electronic configuration & chemical activity

The number of electrons in the outermost energy level determines the activity of the atom

1. If the number of electrons in the outermost energy level is less than 8 electrons, the atom becomes unstable (active), So they do chemical reaction.

Example of, active elements

Element	Symbol	Electronic configuration		
		K	L	M
Sodium	$_{11}\text{Na}$	2	8	1
Magnesium	$_{12}\text{Mg}$	2	8	2
Aluminum	$_{13}\text{Al}$	2	8	3
Element	Symbol	Electronic configuration		
		K	L	M
Phosphorus	$_{15}\text{P}$	2	8	5
Sulphur	$_{16}\text{S}$	2	8	6
Chlorine	$_{17}\text{Cl}$	2	8	7

2. If the number of electrons in the outermost energy level equals 8 electrons, the atom becomes (inactive), So they do not do chemical reaction.

Example of, inactive (noble) elements

Element	Symbol	Electronic configuration		
		K	L	M
Helium	$_2\text{He}$	2	-	-
Neon	$_{10}\text{Ne}$	2	8	-
Argon	$_{18}\text{Ar}$	2	8	8

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Lesson Review

Q1: Complete the following:

1. Atom can't be found in a ----- state
2. Atoms of element are -----, while Atoms of compounds are -----
3. The atom contains of -----, ----- and -----
4. The mass of the atom concentrated in -----
5. The ----- are positively charged, while the ----- are negatively charged
6. The electrons revolve around the nucleus in paths called -----
7. Atomic number is the number of ----- in the nucleus or the number of ----- around the nucleus.
8. Mass number of the number of ----- and -----
9. The rule ----- tells the numbers of the electrons fill the energy level
10. The 2nd energy level satisfied by ----- electrons.
11. Exited atom is the atom that gains -----
12. The quantum is the amount of ----- lost or gained by an ----- when it transfer from an energy level to another.
13. If the number of electrons in the outermost energy level is equal to 8, the atom becomes -----
14. If the number of the electrons in the outermost energy level is less than 8 electrons, the atom becomes -----

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Q2: Write the chemical symbol or the chemical Name:

Write the chemical symbol	Write the chemical Name
Sodium	Hg
Iron	Ag
Magnesium	He
Bromine	Cl
Nitrogen	Zn
Calcium	H
Iron	C
Oxygen	S
Potassium	Ar
Copper	Ne

Q3: Calculate the following:

1. If the nucleus of Sodium atom contains 11 protons and neutrons, find the atomic number and the mass number of Sodium

.....

.....

.....

2. If the nucleus of Calcium atom contains 20 protons and the mass number is 40, find the atomic number and the number of neutrons

.....

.....

.....

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Q4: What is meant by?

1. The atomic number of Oxygen is 8

.....

.....

2. The mass number of Oxygen 16

.....

.....

Q5: Give reason for each of the following:

1. The mass of the atom is concentrated in the nucleus.

.....

.....

2. The atom is electrically neutral.

.....

.....

3. The nucleus is positively charged.

.....

.....

4. The rule $2n^2$ cannot be applied for the fifth energy level.

.....

.....

5. Some elements do chemical reaction.

.....

.....

6. Some elements are mono-atomic (never do chemical reaction).

.....

.....

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Q6: Write the electronic Configuration for the following elements:

1. (${}^7\text{N}$)2. (${}^{19}\text{K}$)3. (${}^{17}\text{Cl}$)4. (${}^{13}\text{Al}$)5. (${}^{18}\text{Ar}$)6. (${}^3\text{Li}$)7. (${}^6\text{C}$)

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Lesson one:

Energy Resources

Energy.

The ability to do work.

- The fuel inside the engine burns and give the energy to move the car.
- The food inside our cells and produce the energy needed to do activities.

The fuel in the car is similar to the food in the body. (Give Reason)

Because both burn and produce, energy needed for work.

Work:

The force acts on a body and moves it for a distance in a certain direction.

$$\begin{array}{ccccc} \text{Work (W)} & = & \text{Force (F)} & \times & \text{Displacement (D)} \\ & & \text{(Joule)} & & \text{(Newton)} & & \text{(Meter)} \end{array}$$

Examples:

- A car moved for a distance 20 Meters pulling a piece of wood by a force of 75 Newton, Calculate the work done by this car.

$$\begin{aligned} - W &= F \times D \\ &= 75 \times 20 = 1500 \text{ Joule.} \end{aligned}$$

- A car moved for a distance 30 Meters pulling a piece of wood by a force of 20 Newton, Calculate the work done by this car.

$$\begin{aligned} - W &= \text{-----} \times \text{-----} \\ &= \text{-----} \times \text{-----} = \text{-----} \text{ Joule.} \end{aligned}$$

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Forms of Energy:**1. Mechanical Energy:**

(P.E + K.E) the energy stored in stretched spring.

2. Electric Energy:

The energy produced from an electric generator.

3. Sound Energy:

The energy produced by music player.

4. Light Energy:

The energy produced by from the light bulb or the candle.

5. Chemical Energy:

The energy stored in the car battery or the food.

6. Heat Energy:

The energy produced from the heater or the stove.

7. Nuclear Energy:

The energy produced from the nucleus of the atom.

Resources of the Energy:**1. Permanent sources of energy (sun only)****2. Renewable sources of energy. (Wind, Waterfalls, Tide and ebb)****3. Non-renewable Sources of energy.**

- The fuel (oil, Coal, natural gas)
- The food (chemical reactions)
- Nuclear Reactions (The reactions in the nucleus of the atom)

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- Some countries try to use the wind, energy to generate electricity (G.R)
Because they are cheap and clean

لا تنس الاشتراك في
قنوات ذاكرولي
على تطبيق التليجرام

تابع جديد ذاكرولي على
فيسبوك
تويتر
وانس اب
تليجرام

اكتب ذاكرولي في البحث وانضم لجروبات ذاكرولي
مع رياض الأطفال للصف الثالث الاعدادي

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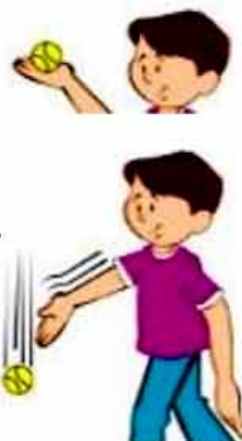
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The Mechanical Energy:**Mechanical energy:**

It is the summation of potential and kinetic energy.

$$\bullet \text{ The work done} = \text{The Mechanical energy} \\ = P.E + K.E$$

- **Potential energy** (when you raise a ball from the ground)
- **Kinetic energy** (when you leave the ball to fall down).

**Potential Energy**

It is the stored energy in the object due its position.

The factors affecting the potential energy:

1. The weight of the object. (P.E directly proportional to w)
2. The height of the object. (P.E directly proportional to h)

$$\text{Potential Energy} = \text{Height (h)} \times \text{Weight (w).}$$

(P.E)

Joule

Meter

Newton

Kinetic Energy:

- It is the energy of the object due to its motion.

The factors affecting the kinetic energy:

1. The mass of the object. (K.E directly proportional to m)
2. The velocity of the object. (K.E directly proportional to V)

$$\text{Kinetic Energy (K.E)} = \frac{1}{2} \text{ Mass (m)} \times \text{Velocity}^2 (V^2)$$

Joule

Kg

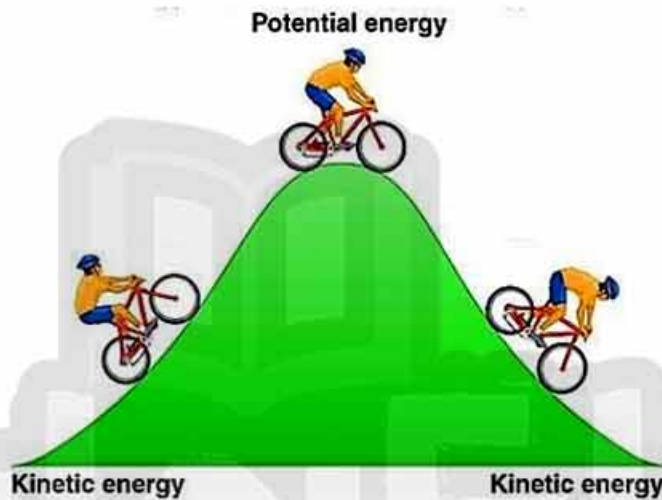
m/s

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Important Note

- Each body has a constant value of mechanical energy
- Mechanical energy is directly to the potential and kinetic energy
- Potential energy is inversely proportional to the kinetic energy



- **At the highest point**, the object has only potential energy.
- **At the middle point**, the object has potential energy = kinetic energy
- **At the ground**, the object has only kinetic energy. [max. speed]

Give reason:

1. **An object moves horizontally has a constant potential energy.**
Because the height does not change
2. **The potential energy of an object increases when the height increases.**
Because the potential energy is directly proportional with the height
3. **The kinetic energy of an object increases when the velocity increases.**
Because the kinetic energy is directly proportional with the velocity

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Problem:

1. A stone has a mass of 0.4 K.g was thrown up and reached a height of 5 m, then its velocity was 4 m/sec. Calculate the following:

1. P.E

2. K.E

3. M.E (Work)

• Weight = $m \times 10 = 4 \text{ N}$

1. P.E = weight x height. = $4 \times 5 = 20 \text{ joule}$

2. K.E = $\frac{1}{2} \times \text{mass} \times \text{velocity}^2$ = $\frac{1}{2} \times 0.4 \times 4^2 = 3.2 \text{ joule.}$

3. [M.E] W = P.E + K.E = $20 + 3.2 = 23.2 \text{ joule.}$

Practice:

2. A stone has a mass of 5 K.g was thrown up and reached a height of 6 m, then its velocity was 4 m/sec. Calculate the following:

1. P.E

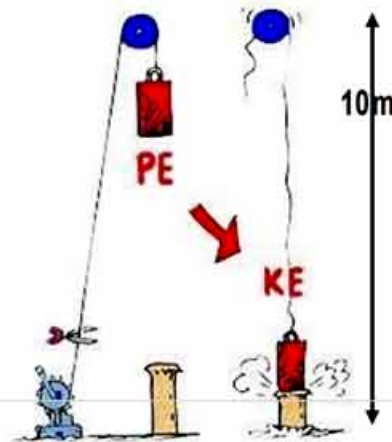
2. K.E

3. M.E (Work)

3. An iron cylinder was lift by a pulley to the maximum height. Calculate the following:

1. P.E when the object at the top

2. K.E when the object at the ground



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Lesson Review

Q1: Complete the following:

1. The ----- is the force acts on a body to move it for a distance
2. The measuring unit if Work is known as -----
3. The renewable resources of energy such as ----- while the non-renewable resources of energy such as -----
4. The factors affecting on the Work done to an object are ----- and -----
5. The factors that affecting the potential energy are ----- and -----
6. The potential energy is the energy ----- in an object at rest.
7. The factors affecting the kinetic energy are ----- and -----
8. The work-done for moving object equals -----
9. The potential energy is ----- Proportional to height of the object from the surface of the earth.
10. A kind of energy produced from the atomic reactions in the nucleus is known as -----
11. Each body has a constant value of ----- energy.
12. The kinetic energy is ----- Proportional to the velocity of the object.
13. The mechanical energy is the sum of ----- and -----
The energy stored in the food molecules is ----- energy
14. The energy used by plants in photosynthesis process ----- energy

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Q2: Give Reason for each of the following:

1. The food in the body is similar to the fuel in the car.

.....

.....

2. The renewable resources of energy are more common in use.

.....

.....

3. The potential energy of an object moves horizontally does not change.

.....

.....

4. The potential energy of an object increases when the height increases.

.....

.....

5. The kinetic energy of an object increases when the velocity increases.

.....

.....

Q3: what happens for each of the following?

1. An object moves horizontally (regarding the P.E)

.....

.....

2. An object moves with increasing speed (regarding the K.E)

.....

.....

Q4: Match.

-----	Potential Energy	1. $\frac{1}{2} mv^2$
-----	Kinetic Energy	2. $F \times d$
-----	Mechanical energy	3. $m \times g \times h$
-----	Work	4. $P.E + K.E$

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Q5: Problems

1. Find the potential energy if the mass body (20 kg), height (10m) and gravity (10 m/sec²)

2. Find the kinetic energy if the mass of the body is (5 kg), height (5m) and gravity (10 m/sec²)

3. Find the mechanical energy if potential energy (20 Joule) and kinetic energy (30 Joule)?

4. An iron cylinder with a weight of 60 N, was lift up ward, then find

- a) At the top

1. P.E

2. K.E

3. M.E

- b) At the middle

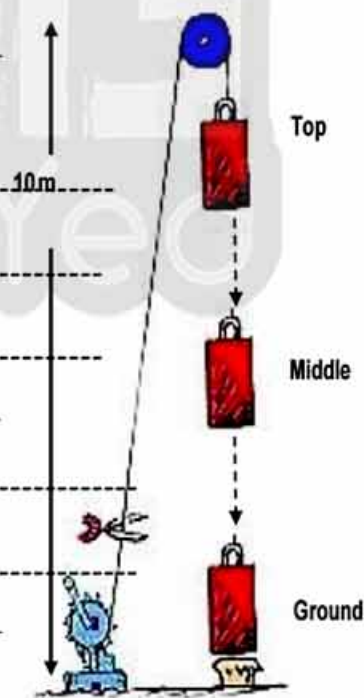
1. P.E

2. K.E

- c) At the ground

1. P.E

2. K.E



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Lesson Two

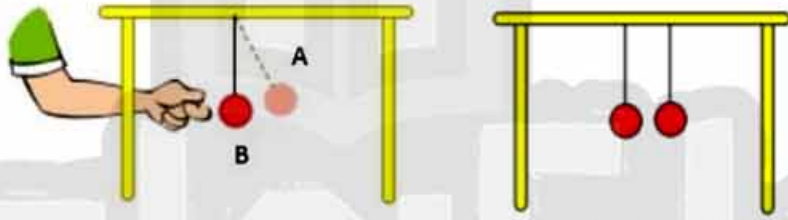
Energy Transformation

- The energy changes from one type to another, without losing any of its value.

Science Activity

Observation:

- What happens when you flick the pendulum?



Put ✓ in front of the correct one

The potential energy reaches maximum at

The kinetic energy reaches maximum at

A

B

Do you think it is ✓ or X

The 2 balls raise up to the same height

The mechanical energy of the 2 balls are the same

Conclusion:

- The P.E and K.E changes but the mechanical energy is the same

The conservation law of Mechanical Energy:

- The sum of potential and kinetic energy of an object is the same.

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Science Activity

Observation:

- What happens when you turn on the following devices?

Put ✓ in front of the correct one

	Heat	Light	Sound
The electric Lamp converts electric energy to			
The electric Heater converts electric energy to			
The electric speaker converts electric energy to			

Conclusion:

- The same kind of energy changes into different types of energy
- Energy never created nor destroyed

The conservation law of Energy:

- Energy neither created nor destroyed, but it converted from one type to another.

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Examples of Energy Transformation

The process	Energy used	Energy produced
On winding a spring toy	Kinetic	Potential
On leaving the spring free	Potential	Kinetic
Rubbing your hands	Kinetic	Heat
Hammering an iron piece	Kinetic	Heat & Sound
Metallic bell (school bell)	Kinetic	Sound
Electric heater, fire.	Electric	Heat
Electric fan	Electric	Kinetic
Electric lamp or bulb	Electric	Light
Battery (dry cells)	Chemical	Electric
Torch	Chemical	Electric → light
Running	Chemical	Heat → kinetic
Photosynthesis	Light	Chemical

Energy Transformation inside the car:

Car Engine	Chemical → Thermal → Mechanical
Car Dynamo	Kinetic → Electric
Car lamps	Electric → Light
Car air conditioner	Electric → Heat
Car Radio	Electric → Sound

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Technological Applications of Energy Transformation:

Application	Energy changes
Sewing Machine	Electric energy into mechanical energy.
Solar Cells	Solar energy into electric energy.
A cellular Phone	Electromagnetic energy waves into sound energy.
Alarm Clock	Chemical energy into kinetic and sound energy.
Television	Electric energy into light and sound energy.

The negative effects of technology:

1. Environmental Pollution.
2. Harming human's life.
3. Bad use of Human in Wars and destruction.

Examples of the negative effect of the technological applications:

Application	Negative Effect	Disease
Car Exhaust	Air pollution	Chest and eye diseases.
Military Explosions	Huge destruction	Diseases leads to death.
Chemical Pesticides	Water, air, and soil pollution	Cancer.
Nuclear Weapons	Huge destruction.	Diseases leads to death.
Mobile Webs	Electromagnetic pollution	Heart diseases.

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Lesson Review

Q1: Complete the following:

1. The energy never ----- nor ----- but, it is only converted from one type to another.
2. The car engine converts the energy from ----- to -----
3. The cell phone converts the energy from ----- to -----
4. The energy is converted from ----- to ----- In the sewing machine.
5. The energy is converted from ----- to ----- During running
6. In the photosynthesis process the energy converted from ----- to -----
7. The chemical pesticides cause ----- disease.
8. car exhausts and air pollution cause ----- disease
9. the electromagnetic pollution cause ----- disease
10. the chemical pesticides cause ----- disease

Q2: Give reason for each of the following:

1. The energy never lost nor gained.

2. Cars have negative effect on the environment and the man.

3. The chemical pesticides have negative effect on man health.

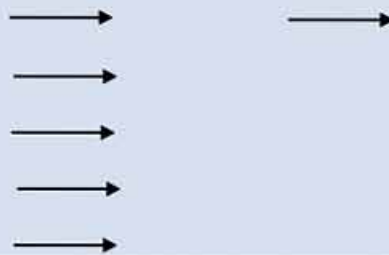
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Q3: Complete the following:

The process	Energy used	Energy produced
On winding a spring toy		
On leaving the spring free		
Rubbing your hands		
Hammering an iron piece		
Metallic bell (school bell)		
Electric heater, fire.		
Electric fan		
Electric lamp or bulb		
Battery (dry cells)		
Torch		
Running		
Photosynthesis		

Car Engine
Car Dynamo
Car lamps
Car air conditioner
Car Radio



Work sheet (3)

Lesson (3)

Complete the following :-

- 1- The symbol of sodium atom is, while that of sulphur atom is
- 2- The mass number is the sum of number and, which exist in the nucleus .
- 3- Electron are particles with charges , while proton are particles with charges .
- 4- The second energy level (L) is saturated with , while the fourth one (N) is saturated with electron
- 5-Active element should have than 8 electron in outermost energy level .

Write the scientific term :-

- 1- The fundamental building unit of matter that can take part in the chemical reaction . ()
- 2- The number of positive proton in the nucleus . ()
- 3- The sum of the number of proton and neutrons in the nucleus . ()
- 4- The number of negative electron that rotate around the nucleus . ()
- 5- Negatively charged particles of negligible mass that revolve around the nucleus . ()
- 6- Imaginary places around the nucleus in which the electron move according their energy . ()

7- The amount of energy lost or gained when an electron transfer from one energy level to another . ()

What is meant by :-

The atom :-

Atomic number :-

Write the symbol :-

- 1- Sodium
- 2- Potassium
- 3- Calcium
- 4- Chlorine
- 5- Nitrogen
- 6- Aluminum

Write the name of the element :-

- 1- H
- 2- He
- 3- Au
- 4- Ag
- 5- Pb
- 6- S

Work sheetLesson 1 unit 2

Give reason for:

1. The K.E at maximum height equal zero.

2. Two cars of mass 5 kg and 15 kg respectively are moving with the same velocity which one has the highest K.E?

Problems

2- A body of mass 2 kg. falls freely from rest from a distance 40 m height by a speed = 5 m/sec

Knowing That $g = 10 \text{ m/s}^2$.

Calculate K.E and P.E

Calculate the K.E of a car moves with velocity 10 m / s if it mass is 900 kg ?

Work sheetLesson 2**. Write the scientific term:**

1. It is used to convert the mechanical energy into to electrical energy.
[.....]
2. It is composed of an acid solution with two different metals dipped in.
[.....]
3. Energy is neither created nor destroyed but it changed from one form to another.
[.....]

- Complete:

1. In the electric lamp energy is converted into energy.
2. On leaving the pendulum to move freely energy is converted to and
this confirm the law of
3. from the technological application that causes air pollution.
4. Electric energy is changed into energy in the electric bell
5. Friction converts energy to energy.
6. The Lemon contains solution.

Evaluation

Atomic Structure Of Matter

Q1

Complete the following statement

1. The Latin name of sodium isand its symbol is
2. The charge of protons isand they present inside the
4. The atomic no. = =
5. No. of energy levels arein the heaviest atom.
6. The energy of level "L" isthan levelbecause the energy of each level depends on
7. The mass of the atom is concentrated in
8. The no. of neutrons = -
9. The charge of the electrons iswhile the charge of atom is
10. The Latin name of Potassium isand its symbol is
11. The Latin name of iron is and its symbol is
12. As we go further from the nucleus, the energy of the level
13. When an electron near the nucleus move to a higher level, it a quantum and the atom become
14. The atomic number of an atom has 3 electrons in "M" level equals.....
15. The energy level "L" of carbon atom (${}_6\text{C}$) contains.....electrons , while that of Sulfur atom (${}_{16}\text{S}$) containselectrons.
16. When atomic number equals mass number. That means that there is no in this atom.

Q2

What happens if:

1. The no. of electrons changes in the atom.
.....
2. The electron loses energy.
.....
3. The electron gains energy.
.....
4. If the no. of electron in the last energy level is less than 8 e.
.....
5. The no. of electron in the last energy level = 8.
.....

Q3**Write the scientific term:**

1. The sum. of no. of protons and neutrons in the nucleus. (.....)
2. Positively charged particles exist inside the nucleus. (.....)
3. Imaginary regions in which electrons rotate. (.....)
4. The amount of energy lost or gained when the electron transfers from an energy level to another. (.....)
5. Elements have 8 electrons in their outermost energy level. (.....)

Q4**Answer the following :****A - Write the electronic configuration of each the following:**

1. $^{40}_{20}\text{Ca}$
2. ^4_2He
3. $^{39}_{19}\text{K}$

a. What is the name of each symbol?

.....

b. Determine the no. of protons, electrons and neutrons.

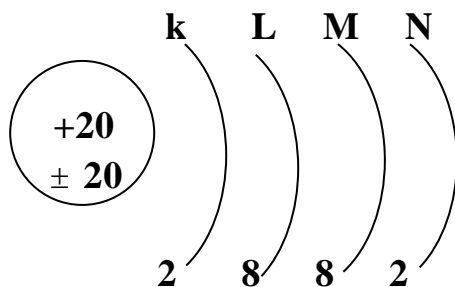
.....

c. Determine if the atom is active or not.

.....

B - An element(X) its atomic no. is 13 and its mass no. is 27

1. Determine the no. of neutrons.
2. Write the electronic configuration.

C - From the following figure find:

1. The atomic no.
- 2- The mass no.
- 3- No. of protons
- 4- No. of electrons
- 5- No. of neutrons

2. D - Write the electronic configuration of each the following:

1. ${}^7_3\text{Li}$ 2. ${}^1_1\text{H}$ 3. ${}^{35}_{17}\text{C}$

- a. What is the name of each symbol?
b. Determine the no. of protons, electrons and neutrons.
c. Determine if the atom is active or not.

E - An element Y has 7 electrons in the third energy level and its mass no. is 35 Determine:

No. of protons. No. of electrons. No. of neutrons.

Write its electronic configuration.

Determine if the atom is active or not.

F - Write the symbol of the following elements:

1. Iron.....2. Mercury.....3. Lead.....
4. Sulphur.....5. Silicon.....6. Bromine.....
7. Zinc.....8. Sodium.....9. Potassium.....

Q5

Give reasons for

1. The symbol of element may be represented in 2 letters.

.....

2. The atom is electrically neutral.

.....

3. The nucleus is +ve charged.

.....

- 4- The mass of the atom is concentrated at the nucleus.

.....

5. The there is a relation between no. of electrons and the chemical activity.

.....

6. Although the last energy level in Helium has 2 electrons it doesn't participate in any chemical reaction.

.....

H) An element Y has 7 electrons in the third energy level and its mass no. is 35

Determine:

No. of protons. No. of electrons. No. of neutrons.

Write its electronic configuration.

Determine if the atom is active or not.

Evaluation

Energy, Resources and forms

Q1 Complete the following statement

- 1- When a body is raised up ,the potential energy ,while the kinetic energy
- 2- When balls falls down ,.....energy changes into.....energy
- 3- At maximum height , the kinetic energy of the object equals
- 4- As the force is increased to double , the work done will
- 5- ,..... and are from the energy resource
- 6- Work = \times

Q2 Choose the correct answer

- 1- is a permanent source of energy
a) petrol b) the sun c) coal
- 2- Food and fuel are sources of energy.
a) chemical b) electric c) sound
- 3- When a body falls freely its
a) P.E decreases and K.E increase b) P.E and K.E increase.
c) P.E and K.E decrease
- 4- When a body is projected upward, the sum. of its P.E and K.E.....
a) increase b) decreases. c) remains constant d) equals
- 5- potential energy equals.....
a) weight \times height b) mass \times height c) no correct answer

Q3 Give reason for

1. The mechanical energy of the body is always constant.
.....
2. The potential energy on the ground = zero.
.....
- 3- The K.E at maximum height equal zero.
.....
- 4- No change in potential energy when the object moves horizontally.
.....

Q4**Problems**

a) An objects ,whose mass is 2 kg and it is at height of 5 cm from earth's surface calculate the potential energy .

.....

b) What is the weight of the body ,whose potential energy is 88 joules and it is at height of 11m?

.....

c) Calculate the K.E of a car moves with velocity 20 m / s if it mass is 900 kg

.....

d) Calculate the kinetic energy of a body its weight 48 N that moves with a speed 4 m/sec. knowing that the gravitational acceleration is 9.8 m/s^2 ?

.....

e) A body of mass 50 kg , calculate the height from the Earth's surface if its P.E at that height equals 2500 joule ($g = 10 \text{ m/s}^2$) .

.....

f) A body of weight 20N and its mass is 2 kg was thrown upward .

Height	Velocity	P.E	K.E	M.E
0 m	10	.....	100	.....
3.75	.....	.....	25 Joule	.....
.....	0	.....	.....	.....

Q5**What's meant by?**

1-Energy :

.....

2-Mechanical energy :

.....

Evaluation

Energy Transformations

Q1 What's meant by

- Energy conservation Law.

.....

Q2 Complete the following statement

1. In the electric lampenergy is converted intoenergy.
2. On leaving the pendulum to move freelyenergy is converted toand this confirm the law of
3. In the moving swing the sum. ofandenergies at any moment is
4. The Lemon containssolution.
5.from the technological application that causes air pollution.
6. Electric energy is changed intoenergy in the electric bell.

Q3 Give reason for

- 1-The pendulum, the kinetic energy of vibration body decrease when it goes away from its original position to its highest point .
.....
- 2- The movement of the compass needle when we put it nears to the simple cell.
.....
- 3-Car engine is important to the car.
.....

Q4 Write the scientific term

1. It is used to convert the mechanical energy into to electrical energy. [...]
2. It is composed of an acid solution with two different metals dipped in. [...]
3. Energy is neither created nor destroyed but it changed from one form to another [...]
4. The sum. of P.E and K.E of an object under the effect of gravity is constant. [...]
5. Instrument is used to convert the chemical energy into electrical energy. [...]

Unit 1

(Matter and its Construction)

Lesson 3 (Atomic Structure of Matter)

▪ **Choose the correct answer.**

1- The atom is electrically

- a. positive
- b. neutral
- c. negative

2- The fourth energy level is saturated by.....electrons.

- a. 32
- b. 18
- c. 8
- d. 2

3- The electron ischarged particle.

- a. positively
- b. negatively
- c. neutrally

4- The monoatomic liquid is

- a. Hg
- b. Ag
- c. Mg
- d. Br

5- The number of electrons that saturates the level (K) is.....

- a.8
- b.2
- c.32

6- Positive charged particles in the nucleus of atom are

- a. neutrons.
- b. protons.
- c. electrons.

7- Potassium is symbolized by

- a. P
- b. K
- c. B

8- The rule which is used to calculate number of electrons that saturate the first four energy levels is

- a. $2^2 n$
- b. $2n^2$
- c. $2n$
- d. n^2

9- When atomic number of an element equals its mass number, this means that there aren'tin the atom of this element.

- a. electrons
- b. protons
- c. neutrons
- d. photons

10-The symbol which represents silver element is.....

- a. S
- b. Si
- c. Au
- d. Ag

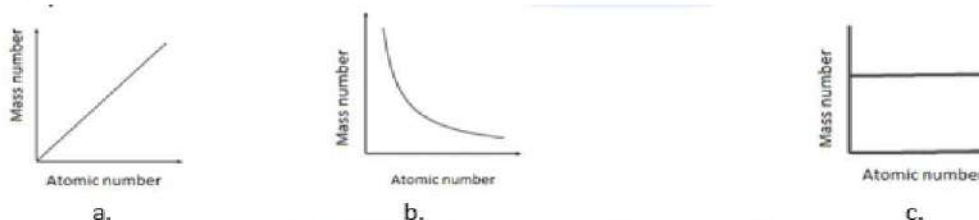
11-The symbol of copper is

- a. C
- b. Co
- c. Cu

12-The outermost energy level of an atom whose atomic number is 12 contains.....electrons.

- a. 2
- b. 8
- c. 10
- d. 12

13-The figure represents the relation between atomic number and mass number.



14-Which statement is true about the proton?

- a. They are positively charged particles outside the nucleus of the atom.
- b. The number of neutrons may be less than the number of electrons.
- c. The number of protons is less than the number of electrons.
- d. As the number of protons changes, the mass of the atom changes and the atom becomes an atom of another element.

15. If the nucleus of the atom contains 11 protons and 12 neutrons, so its mass number is

- a.11
- b.23
- c.1
- d.12

16. The third energy level is saturated withelectrons.

- a.2
- b.10
- c.18
- d.8

17. The nucleus of atom doesn't contain neutrons.

- a. neon
- b. hydrogen
- c. oxygen
- d. helium

▪ **Complete the following statements:**

1. The potential energy of an object depends on and
2. The atom nucleus contains and
3. The symbol of potassium atom is , while the symbol of silver atom is
4. The electrons have charge.
5. Silver symbol is , whereas sulphur symbol is
6. Potassium $_{19}\text{K}$ has electrons in the outermost energy level, but $_{18}\text{Ar}$ has electrons in the outermost energy level .
7. The symbol of the second energy level is
8. The electrons revolve around the in imaginary regions known as

▪ **Write the scientific term:**

1. The sum of the numbers of protons and neutrons inside the nucleus of the atom. (.....)
2. Amount of energy which an electron loses or gains to transfer from an energy level into another one. (.....)
3. Imaginary places in which electrons can move according to their energies. (.....)
4. The number of positive protons in the nucleus. (.....)
5. Electrically neutral particles are found in the nucleus. (.....)

▪ **Correct the underlined words :**

1. The electron can transfer to a higher energy level if it loses energy.
2. Carbon is symbolized by Ca.
3. The atom mass is concentrated inside the electrons.
4. The relation ($2n^2$) is not applied to energy level higher than 5th level.

▪ **Put (✓) or (×) :**

1. Mass number is the sum of protons and electrons numbers. ()
2. Mass number is the number of neutrons in the nucleus. ()
3. Neutrons are found inside the nucleus and carries positive charges. ()

4. Neutrons are particles, which are negatively charged of negligible mass and revolve around the nucleus. ()
5. The third energy level is saturated with 18 electrons. ()

▪ **Give reason :**

The atom is electrically neutral.

.....

▪ **What happens in each of the following cases...?**

1. The nucleus of an atom doesn't contain neutrons.
-

2. An electron gains a quantum of energy.
-

▪ **What is meant by :**

Atomic number.

.....

▪ **Write the symbols of the following:**

1. Oxygen
2. Copper
3. Iron
4. Hydrogen
5. Sodium
6. Carbon
7. Argon.
8. Calcium
9. Aluminum
10. Mercury
11. Zinc
12. Silver

▪ **Mention one difference between :**

The electron and the proton.

▪ **Cross the odd word :**

${}_6\text{C}$ - ${}_{10}\text{Ne}$ - ${}_9\text{F}$ - ${}_7\text{N}$

An atom of chlorine has 17 electrons and 18 neutrons

1. Use these numbers to calculate (a) and (b), then write its symbol correctly as (${}_a^b\text{X}$).
2. What does each of the letters (a) and (b) refer to?

Write the electronic configuration of the following atom:

${}_{11}^{23}\text{Na}$

,

${}_3^7\text{Li}$

,

${}_{18}^{40}\text{Ar}$

,

${}_{10}^{20}\text{He}$

${}_7\text{N}$

,

${}_{17}\text{Cl}$

,

${}_{20}\text{Ca}$

,

${}_{10}\text{Ne}$

Unit 2 (Energy)

Lesson 1 (Energy; Resources and Forms)

Choose the correct answer.

1- The produced energy by burning the fuel isenergy.

- a. potential
- b. nuclear
- c. heat

2- An object of weight 6 newton, moved to a height 5 m, its potential energy isjoules.

- a. 30
- b. 75
- c. 11

3- The Sun is a.....source of energy.

- a. non-renewable
- b. renewable
- c. permanent
- d. all the previous

4- An object of mass 1 kg moves at speed 4 m/s., so it has a kinetic energy =joule.

- a. 16
- b. 8
- c. 64
- d. 4

5-..... is a renewable source of energy.

- a. coal
- b. petrol
- c. wind
- d. natural gas

6- As doubling height to which an object is raised from ground, so the

- a. kinetic energy is increased to its double value.
- b. potential energy is increased to 3 times.
- c. potential energy is increased to its double value.
- d. mechanical energy is increased to 4 times.

7- As an object launched upwards,

- a. its speed decreases.
- b. its speed increases.
- c. its kinetic energy increases gradually.
- d. its potential energy decreases gradually.

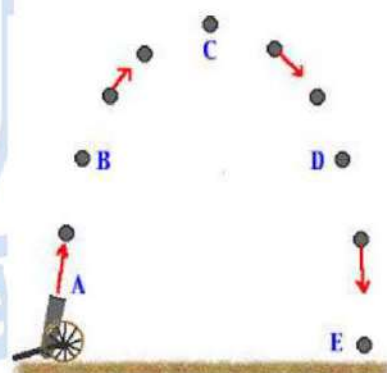
8-In the shown figure:

i)The maximum value of the potential energy is at position

- a. (A)
- b. (B)
- c. (C)
- d. (D)

ii)The mechanical energy is equal to

- a. Kinetic energy at (A) + potential energy at (B)
- b. Kinetic energy at (A) + potential energy at (C)
- c. Kinetic energy at (B) + potential energy at (E)
- d. Kinetic energy at (D) + potential energy at (D)



9- Chemical energy is stored in

- a. stretched spring
- b. car battery
- c. car lamps
- d. pendulum.

10-In the simple pendulum, the potential energy at the maximum height =

- a. kinetic energy
- b. zero
- c. mechanical energy
- d. 10 joules.

▪ **Complete the following statements:**

1. Energy is the ability to do, and its measuring unit is
2. The energy stored in the food is, energy, while.....energy is produced from the dry cell.
3. When an object is launched upwards. its speed
4. When a body raised up, the potential energy, while the kinetic energy
5. An object of mass 2 kg is moving at a speed of 4 m/s has a kinetic energy
6. The potential energy of an object depends on and
7. Potential energy = x
8. If you bounce a basketball on the ground, its speedas it comes closer to the ground, and itenergy decreases.

▪ **Write the scientific term:**

1. Energy stored in the object due to the work done on the object. ()
2. It is the work done during the motion of an object. ()

▪ **Correct the underlined words :**

1. Resource of permanent energy is nuclear energy.
2. Measuring unit of weight is joule.
3. The chemical energy of the object is equal to the sum of the potential and kinetic energies.
4. Wind is a non-renewable source of energy.

▪ **Put (✓) or (x) :**

1. Fuel in a car as food for a man. ()
2. The measuring unit of potential energy is the joule. ()
3. The kinetic energy of a static object equals zero. ()
4. Potential energy of an object decreases by increasing its height. ()
5. Weight = Mass + Acceleration due to gravity.

▪ **Write the mathematical rule used to find: (mention the units)**

1. Work done to move an object from one point to another.
2. Weight.

▪ **What happens when :**

1. The height of an object is doubled (concerning its potential energy).

.....

2. Doubling the weight of an object (concerning its potential energy).

.....

▪ **What is meant by?**

1. Kinetic energy.

.....

2. Potential energy.

.....

▪ **Problems:**

1. Find the weight of an object of potential energy 88 joules when it is found at a height of 11m.

2. A car of mass 50 kg is moving with a speed 5m/s. Calculate its kinetic energy.

3. Calculate the potential energy of an object its weight is 20 N. and placed at 2m. height from the ground.

4. A ball of mass 0.5 kg was launched upwards at a speed 3 m/sec. to a height 4m. Calculate its potential energy and kinetic energy.(knowing that the acceleration due to gravity = 10m/sec^2 .)

5. A ball was thrown vertically upwards at a speed 5 m/sec. to a height 10 m. what is the work done on the ball if its weight is 7 newton and has a mass of 0.5 kg?

Unit 2 (Energy)

Lesson 2 (Energy Transformation)

Choose the correct answer.

1- In car engine the chemical energy is changed into.....energy.

- a. magnetic
- b. electric
- c. mechanical

2- The electric energy is converted into kinetic energy in

- a. electric lamp.
- b. electric fan.
- c. electric heater.

3- Dynamo converts mechanical energy into.....energy.

- a. electric
- b. nuclear
- c. solar

4- The solar heater changes solar energy into.....energy.

- a. chemical
- b. electric
- c. kinetic
- d. heat

5- The electric energy is converted into kinetic energy in

- a. electric lamp.
- b. cellular phone.
- c. electric fan.

6- On doubling the height the potential energy is.....

- a. constant.
- b. doubled.
- c. increased four times.

Complete the following statements.

- 1- In the simple cell,energy changes into.....energy.
- 2- The simple cell consists of.....solution and two different metals.
- 3- Electric energy is converted into kinetic energy in
- 4- The electric circuit contains..... to produce electric energy and to use this electric energy.
- 5- In the dynamo,energy changes into energy.
- 6- If the potential energy of an object is 100 joules and its kinetic energy is 50 joules, its mechanical energy is
- 7- Energy is neitheror....., but it can be converted from one form to another.
- 8- The two metals in the simple electric cell areand
- 9- The simple electric cell, the positive pole is, while the negative pole is

▪ **Write the scientific term:**

1. The sum of potential and kinetic energies of a body. (.....)
2. Energy is neither created nor destroyed but can be transformed into another form.(.....)
3. Pollution produced from the web of cellular phone. (.....)

▪ **Put (✓) or (×) :**

1. The positive pole in a simple cell is lead. ()
2. When the ball of pendulum goes away from its original position, its kinetic energy increases. ()
3. Chemical energy can be stored in stretched spring. ()
4. In the car dynamo electric energy is changed into kinetic energy. ()
5. In the electric cell, the electric energy is converted into chemical energy. ()

▪ **Correct the underlined words :**

1. In simple cell the positive pole is a rode of zinc.
2. The electric fan produces heat energy.
3. Solar batteries change mechanical energy into mechanical energy.

What happens in the following case...?

Overuse of chemical pesticides.

.....

Mention:

Two technological applications, then mention the energy transformation in each one.

.....

.....

Show by a complete labeled drawing the structure of the simple electric cell and mention the idea of its operation.

